Data from the Arctic Grayling Sport Fishery on the Kakisa River, Northwest Territories, 1983 and 1984

G. Low and C.J. Read

Central and Arctic Region
Department of Fisheries and Oceans
Winnipeg, Manitoba R3T 2N6

May 1987

Canadian Data Report of Fisheries and Aquatic Sciences No. 642

87-04045/

Canadian Industry Report of Fisheries and Aquatic Sciences

Industry reports contain the results of research and development useful to industry for either immediate or future application. They are directed primarily toward individuals in the primary and secondary sectors of the fishing and marine industries. No restriction is placed on subject matter and the series reflects the broad interests and policies of the Department of Fisheries and Oceans, namely, fisheries and aquatic sciences.

Industry reports may be cited as full publications. The correct citation appears above the abstract of each report. Each report is abstracted in *Aquatic Sciences and Fisheries Abstracts* and indexed in the Department's annual index to scientific and technical publications.

Numbers 1–91 in this series were issued as Project Reports of the Industrial Development Branch, Technical Reports of the Industrial Development Branch, and Technical Reports of the Fisherman's Service Branch. Numbers 92–110 were issued as Department of Fisheries and the Environment, Fisheries and Marine Service Industry Reports. The current series name was changed with report number 111.

Industry reports are produced regionally but are numbered nationally. Requests for individual reports will be filled by the issuing establishment listed on the front cover and title page. Out-of-stock reports will be supplied for a fee by commercial agents.

Rapport canadien à l'industrie sur les sciences halieutiques et aquatiques

Les rapports à l'industrie contiennent les résultats des activités de recherche et de développement qui peuvent être utiles à l'industrie pour des applications immédiates ou futures. Ils sont surtout destinés aux membres des secteurs primaire et secondaire de l'industrie des pêches et de la mer. Il n'y a aucune restriction quant au sujet; de fait, la série reflète la vaste gamme des intérêts et des politiques du ministère des Pêches et des Océans, c'est-à-dire les sciences halieutiques et aquatiques.

Les rapports à l'industrie peuvent être cités comme des publications complètes. Le titre exact paraît au-dessus du résumé de chaque rapport. Les rapports à l'industrie sont résumés dans la revue *Résumés des sciences aquatiques et halieutiques*, et ils sont classés dans l'index annuel des publications scientifiques et techniques du Ministère.

Les numéros 1 à 91 de cette série ont été publiés à titre de rapports sur les travaux de la Direction du développement industriel, de rapports techniques de la Direction du développement industriel, et de rapports techniques de la Direction des services aux pêcheurs. Les numéros 92 à 110 sont parus à titre de rapports à l'industrie du Service des pêches et de la mer, ministère des Pêches et de l'Environnement. Le nom actuel de la série a été établi lors de la parution du numéro 111.

Les rapports à l'industrie sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Canadian Data Report of
Fisheries and Aquatic Sciences 642

May 1987

DATA FROM THE ARCTIC GRAYLING SPORT FISHERY ON THE KAKISA RIVER, NORTHWEST TERRITORIES, 1983 AND 1984

by

G. Low and C.J. Read

Central and Arctic Region
Department of Fisheries and Oceans
Winnipeg, Manitoba R3T 2N6

This is the 13th Data Report
from the Central and Arctic Region, Winnipeg

OUR APOLOGIES

Our printer has goofed and on the inside front cover of Data Reports issued recently from the Freshwater Institute the information printed refers to the Industry Report series. Should you require information about the Data Report series please refer to another issue of the series or write to the Freshwater Institute Library

© Minister of Supply and Services Canada 1987

Cat. no. Fs 97-13/642E ISSN 0706-6465

Correct citation for this publication is:

Low, G., and C.J. Read. 1987. Data from the Arctic grayling sport fishery on the Kakisa River, Northwest Territories, 1983 and 1984. Can. Data Rep. Fish. Aquat. Sci. 642: iv + 12 p.

TABLE OF CONTENTS

	Page
ABSTRACT/RÉSUMÉ	iv
INTRODUCTION	1
MATERIALS AND METHODS	1
Creel census and biological sampling	1
Data analysis	1
ACKNOWLEDGMENTS	1
REFERENCES	1

LIST OF FIGURES

Figure		Page
1	Map of the upper Mackenzie River area showing the location of Kakisa River	3
2	Map of the Kakisa River showing camping, fishing, and tagging areas	4

LIST OF TABLES

Table		Page
1	Creel census summary from Kakisa River, 1983	5
2	Information on the fishing period and creel census from Kakisa River, 1983	6
3	Information on the catch, effort and catch per unit of effort for Arctic grayling during the creel census period from Kakisa River, 1983	6
4	Information on the total catch and harvest of Arctic grayling from Kakisa River, 1983	6
5	Creel census summary from Kakisa River, 1984	7
6	Information on the fishing period and creel census from Kakisa River, 1984	8
7	Information on the catch, effort and catch per unit of effort for Arctic grayling during the creel census period from Kakisa River, 1984	8
8	Information on the total catch and harvest of Arctic grayling from Kakisa River, 1984	8
9	Summary of number of anglers and angler-hours by place of residence as determined during the creel census period on Kakisa River, 1983.	9
10	Summary of number of anglers and angler-hours by place of residence as determined during the creel census period on Kakisa River, 1984.	9
11	Creel census summary for Arctic grayling from Kakisa River, 1974-1984	10
12	Biological data by length interval for Arctic grayling caught by angling, at Kakisa River, 1983	11
13	Biological data by age group for Arctic grayling caught by angling, at Kakisa River, 1983	11
14	Biological data by length interval for Arctic grayling caught by angling, at Kakisa River, 1984	12
15	Biological data by age group for Arctic grayling caught by angling, at Kakisa River, 1984	12

ABSTRACT

Low, G., and C.J. Read. 1987. Data from the Arctic grayling sport fishery on the Kakisa River, Northwest Territories, 1983 and 1984. Can. Data Rep. Fish. Aquat. Sci. 642: iv + 12 p.

Data from the creel census and biological sampling programs on the Kakisa River sports fishery for 1983 and 1984 are presented. In 1983, 618 anglers were interviewed. They spent 1 591.5 hours angling with a success rate of 2.0 grayling per angler or 0.8 grayling per angler-hour. The 1983 catch was estimated to be 1 246 grayling of which 52.6% were retained, resulting in a harvest of 714 fish. In 1984, 603 anglers interviewed spent a total of 1 729 hours angling. The success rate was 2.0 grayling per angler or 0.7 grayling per angler-hour. The 1984 catch was estimated to be 1 339 grayling of which 49.1% were retained, resulting in a harvest of 725 fish. A total of 401 Arctic grayling, Thymallus arcticus (Pallas) were sampled for length, weight, age, sex and stage of maturity.

Key words: angling; catch effort; sport fishing; statistics; fishery management; monitoring.

RÉSUMÉ

Low, G., and C.J. Read. 1987. Data from the Arctic grayling sport fishery on the Kakisa River, Northwest Territories, 1983 and 1984. Can. Data Rep. Fish. Aquat. Sci. 642: iv + 12 p.

Les données recueillies dans le cadre des programmes de recensement des prises et d'échantillonnage biologique appliqués à la pêche sportive sur la Kakisa en 1983 et 1984 sont présentées. En 1983, 618 pêcheurs à la ligne ont été interrogés; ils ont passé au total 1 591,5 heures à pêcher pour prendre 2,0 ombres arctiques par pêcheur ou 0,8 ombre par pêcheur par heure. En 1983, les prises ont été estimées à 1 246 ombres, dont 52,6% n'ont pas été relâchés, pour un total de 714 poissons. En 1984, 603 pêcheurs à la ligne ont été interrogés et ont passé au total 1 729 heures à pêcher pour prendre 2,0 ombres par pêcheur ou 0,7 ombre par pêcheur par heure. Les prises de 1984 sont estimées à 1 339 ombres, et 41,9% n'ont pas été relâchés, pour un total de 725 poissons. Au total, 401 ombres arctique, Thymallus arcticus (Pallas) ont été échantillonnés et les données sur la longueur, le poids, l'âge, le sexe et la maturité ont été recueillies.

Mots-clés: pêche à la ligne; prises/effort; pêche sportive; statistiques; gestion des pêches; contrôle.

INTRODUCTION

The spawning run of Arctic grayling, Thymallus arcticus (Pallas), on the Kakisa River provides a popular spring fishery for the residents of the south Great Slave Lake area and northern Alberta (Moshenko and Low 1983). There is easy access to this spawning concentration of grayling via the Mackenzie Highway and the river provides one of the first angling opportunities of spring. The study area and the Kakisa River sports fishery have been described in detail by Moshenko and Low (1983).

In the spring of 1983 a creel census and biological sampling program was conducted on the Kakisa River as part of an ongoing monitoring program initiated in 1971. The results of previous studies are reported by Falk and Dahlke (1975), Falk et al. (1980), Moshenko and Low (1983) and Dahlke (1983). In the spring of 1984 the creel census and biological sampling program was repeated to coincide with a more detailed stock assessment study of the Kakisa River sports fishery. Results of the stock assessment study and recommendations on future management of the Kakisa River sports fishery will be reported by M. Roberge, Department of Fisheries and Oceans, Winnipeg.

This report presents the results of the 1983 and 1984 creel census studies in tabular form.

MATERIALS AND METHODS

CREEL CENSUS AND BIOLOGICAL SAMPLING

In 1983, anglers were censused during the period 22 April to 15 May and in 1984 between 14 April and 08 May. Creel census techniques were adapted from Falk et al. (1973, 1974) and Moshenko and Gillman (1978), and were consistent with creel methods used in previous studies on the river. Anglers were interviewed at the end of their fishing day at the various river access points (Fig. 2). The following information was recorded for each angler: place of residence, number of fish of each species caught, released and retained and the time spent fishing (to the nearest half hour). An angler was considered to be successful if any fish had been caught regardless of size, species or the amount of time spent fishing. The creel was run from morning to late evening and efforts were made to interview all anglers directly. A record of the total number of anglers encountered during the day was kept. Total harvest and effort data were then calculated by extrapolation using data gathered from the actual angler interviews. The creel census period was timed to coincide with the intensive spring fishery for Arctic grayling which occurs shortly after ice break-up.

Anglers were interviewed on a daily basis until the catch of grayling dropped off at the end of the spawning run. Once the catch per unit effort had dropped, discouraging most anglers from fishing, the creel census surveys were terminated. Some grayling do stay in the river during the summer months, however catch and fishing effort are low compared to that during the spawning run (Falk and Dahlke 1975). The summer fishery was not surveyed in 1983 or 1984 and any fish caught after the spring creel census surveys were not included in estimates of total harvest.

A release mortality of 10% was added in the actual harvest retained in order to calculate the total number of grayling killed. This figure is based on hook mortality studies by Falk and Gillman (1975).

A subsample of Arctic grayling from the anglers' creel was taken for fork length (+ 1 mm), round weight (+ 50 g), sex and stage of maturity and scales. Scales were collected and aged using methods reported in Falk et al. (1980). Stage of maturity was determined by examining the gonads and coded according to the maturity stages described in Falk et al. (1980).

DATA ANALYSIS

All biological data were analyzed using the Amdahl 5850 computer based at the University of Manitoba. The Statistical Analysis System (1982) was used to generate length, weight and age tables and perform basic calculations.

ACKNOWLEDGMENTS

The authors wish to thank all participating anglers for providing information during the creel census programs. Special thanks to M. Bourque, K. Fisher, G. Hordal and P. Sparling for conducting the creel census and biological sampling. Department of Fisheries and Oceans staff in Hay River provided logistic support. Figures were prepared by Graphic Services and typing was done by D. Norman. A.H. Kristoffersson and R.W. Moshenko reviewed the manuscript.

REFERENCES

DAHLKE, L.W. 1983. Data on the Arctic grayling sport fishery at Kakisa River, Northwest Territories, 1980. Can. Data Rep. Fish. Aquat. Sci. 90: iv + 11 p.

FALK, M.R., D.V. GILLMAN, and L.W. DAHLKE. 1973. The 1972 sport fisheries on Great Bear and Great Slave lakes, Northwest Territories. Can. Fish. Mar. Serv. Tech. Rep. Ser. CEN/T-73-3: 100 p.

FALK, M.R., D.V. GILLMAN, and L.W. DAHLKE. 1974. 1973 creel census data from sport fishing lodges on Great Bear and Great Slave lakes, Northwest Territories. Can. Fish. Mar. Serv. Data Rep. Ser. CEN/D-74-5: 28 p.

FALK, M.R., and D.V. GILLMAN, 1975. Mortality data for angled Arctic grayling and Pike Northern from the Great Slave Lake area, Northwest Territories. Can. Fish. Mar. Serv. Data Rep. Ser. CEN/D-75-1:24 p.

FALK, M.R., and L.W. DAHLKE. 1975. Creel and biological data from streams along the south shore of Great Slave Lake, 1971-74. Can. Fish. Mar. Serv. Data Rep. Ser. CEN/D-75-8: 87 p.

FALK, M.R., G. LOW, D.V. GILLMAN, and G.W. CARDER. 1980. Data from the Arctic grayling sports fishery on Kakisa River, Northwest Territories, 1979. Can. Data Rep. Fish. Aquat. Sci. 199: 13 p.

MOSHENKO, R.W., and D.V. GILLMAN. 1978. Creel census and biological investigation on lake trout, Salvelinus namaycush (Walbaum), from Great Bear and Great Slave lakes, Northwest Territories, 1973-76. Can. Fish. Mar. Serv. Manuscr. Rep. 1440: v + 37 p.

MOSHENKO, R.W., and G. LOW. 1983. Data from the Arctic grayling sport fishery on the Kakisa River, Northwest Territories, 1971-78. Can. Data Rep. Fish. Aquat. Sci. 388: iv + 27 p.

STATISTICAL ANALYSIS SYSTEM (SAS) INSTITUTE INC. 1982. SAS user's guide: Basics, 1982 edition. Cary, NC. 923 p.

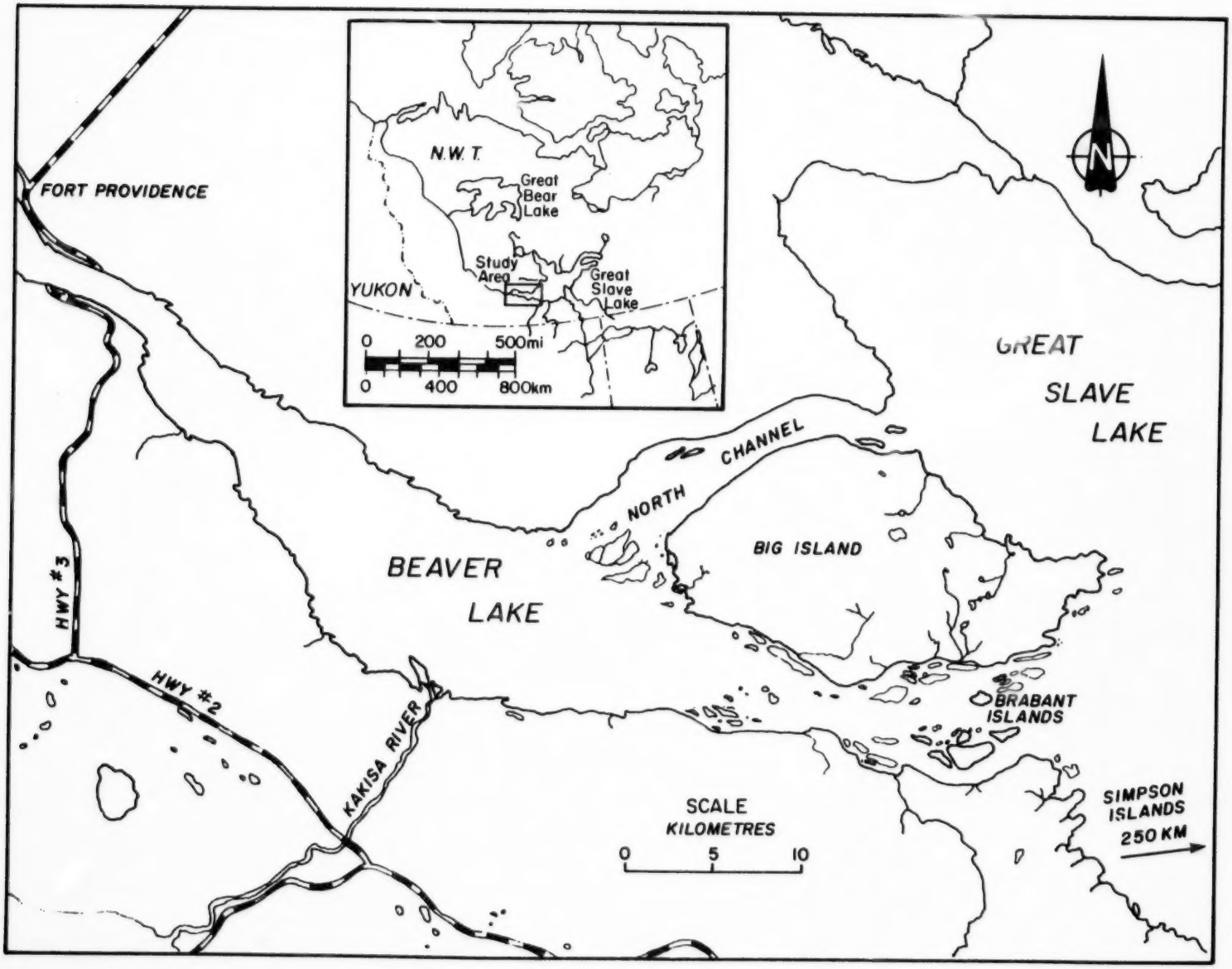

Fig. 1. Map of the upper Mackenzie River area showing the location of Kakisa River.

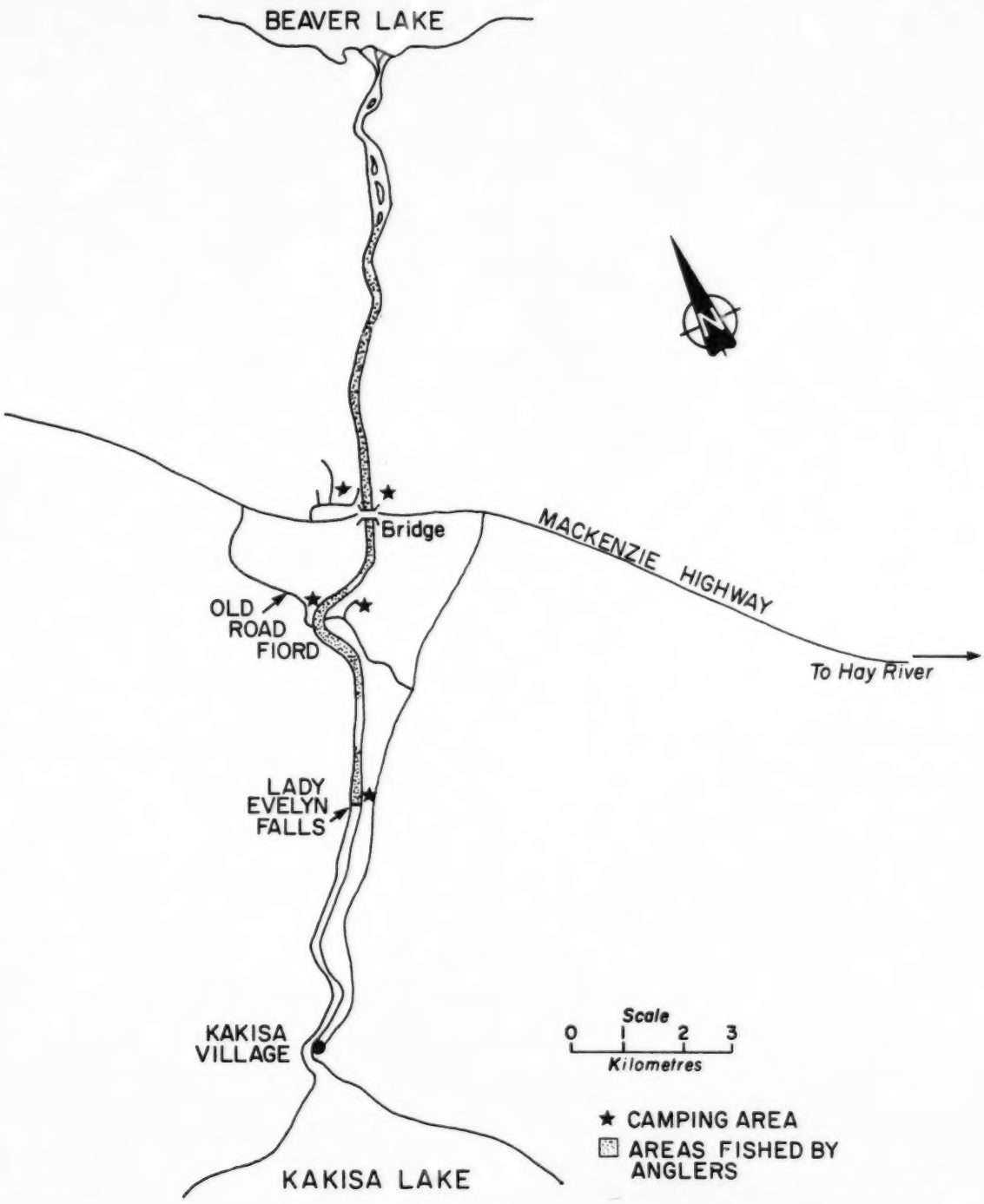

Fig. 2. Map of the Kakisa River showing the camping, fishing areas.

Table 1. Creel census summary from Kakisa River, 1983.

Date	No. anglers		Percent Successful	A. Grayling			N. Pike			Y. Walleye			L.N. Sucker			L. Whitefish			Total Hours Fished	No. Fish Caught	
	Interviewed	Not Interviewed		C[1]	R[2]	K[3]	C	R	K	C	R	K	C	R	K	C	R	K		Per Angler	Per Angler-Hour
22/4	7	3	70.0	22	10	12	-	-	-	-	-	-	-	-	-	-	-	-	26.0	2.2	0.8
23/4	6	3	66.7	27	18	9	-	-	-	-	-	-		-	-	3	3	0	30.0	3.3	1.0
24/4	21	4	84.0	85	42	43	1	1	0	-	-	-	-	-	-	-	-	-	67.5	3.4	1.3
25/4	15	8	65.2	58	17	41	-	-	-	-	-	-	-	-	-	-	-	-	66.5	2.5	0.9
26/4	12	3	80.0	36	7	29	-	-	-	3	0	3	-	-	-	-	-	-	39.5	2.6	1.0
27/4	14	2	88.0	59	24	35	4	4	0	4	0	4	-	-	-	-	-	-	45.5	4.2	1.5
28/4	13	2	86.7	46	28	18	1	1	0	-	-	-	-	-	-	-	-	-	23.5	3.1	2.0
29/4	13	3	81.3	42	17	25	5	4	1	-	-	-	-	-	-	-	-	-	37.0	2.9	1.3
30/4	25	12	67.6	229	179	501	1	9	2	-	-	-	1	0	1	1	0	1	127.5	6.5	1.9
1/5	22	35	38.6	91	47	44	-	-	-	-	-	-	-	-	-	-	-	-	66.5	1.6	1.4
2/5	5	7	41.7	7	0	7	-	-	-	-	-	-	-	-	-	-	-	-	18.5	0.6	0.4
3/5	5	10	33.3	9	0	9	-	-	-	-	-	-	-	-	-	-	-	-	42.5	0.6	0.2
4/5	4	16	25.0	13	6	7	-	-	-	-	-	-	-	-	-	-	-	-	45.5	0.8	0.3
5/5	12	4	75.0	44	23	21	-	-	-	-	-	-	-	-	-	-	-	-	67.5	2.8	0.7
6/5	25	3	89.3	83	36	47	2	2	0	-	-	-	-	-	-	-	-	-	108.5	3.0	0.8
7/5	35	22	61.4	136	68	68	2	2	0	-	-	-	-	-	-	1	0	1	180.0	2.4	0.8
8/5	30	37	44.8	40	6	34	1	0	1	-	-	-	-	-	-	-	-	-	157.0	0.6	0.3
9/5	17	4	81.0	27	0	27	3	3	0	-	-	-	-	-	-	-	-	-	74.5	1.4	0.4
10/5	22	7	75.9	38	1	37	-	-	-	-	-	-	-	-	-	-	-	-	70.0	1.3	0.5
11/5	15	8	65.2	63	36	27	8	2	6	-	-	-	1	0	1	-	-	-	50.5	3.1	1.4
12/5	20	6	76.9	64	24	40	2	0	2	-	-	-	-	-	-	-	-	-	80.0	2.5	0.8
13/5	1	27	3.6	2	0	2	-	-	-	-	-	-	-	-	-	-	-	-	40.0	0.1	0.1
14/5	14	15	48.3	20	2	18	8	1	7	-	-	-	-	-	-	-	-	-	78.0	1.0	0.4
15/5	4	20	16.7	5	0	5	1	0	1	-	-	-	-	-	-	-	-	-	49.5	0.3	0.1
Total	357	261	57.8	1246	591	655	49	29	20	7	0	7	2	0	2	5	3	2	1591.5	-	-
Mean	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.2	0.8
Percent Retained				52.6			40.8			100.0			100.0			40.0					
No. Caught per angler-hour				0.78			0.03			<0.01			<0.01			<0.01					
No. Caught per angler				2.02			0.07			0.01			0.01			0.01					

[1]Number caught
[2]Number released
[3]Number kept

Table 2. Information on the fishing period and creel census from Kakisa River, 1983.

Spring Fishing Period				Creel Census Period				Angler - Interviews	
From	To	Days	Percent Fished	From	To	Days	Percent Censused	Conducted	Possible
22 April	15 May	24	100	22 April	15 May	24	100	618	618

Table 3. Information on the catch, effort and catch per unit of effort for Arctic grayling during the creel census period from Kakisa River, 1983.

No. Anglers	No. Caught	No. Released	No. Retained	Percent Retained	Hours Fished	Hours Fished Per Angler	No. Caught		No. Retained
							Per Angler-Day	Per Angler-Hour	Per Angler-Day
618	1246	591	655	52.6	1591.5	2.6	2.0	0.8	1.1

Table 4. Information on the total catch and harvest of Arctic grayling from Kakisa River, 1983.

No. Caught	No. Released	No. Retained	Estimated Release Mortality	Total Harvest Plus Mortality
1246	591	655	59	714

Table 5. Creel census summary from Kakisa River, 1984.

Date	No. anglers		Percent Successful	A. Grayling			N. Pike			Y. Walleye			L. Whitefish			Total Hours Fished	No. Fish Caught	
	Interviewed	Not Interviewed		C[1]	R[2]	K[3]	C	R	K	C	R	K	C	R	K		Per Angler	Per Angler-Hour
14/4	3	0	100.0	6	4	2	-	-	-	-	-	-	-	-	-	4.5	2.0	1.3
18/4	3	4	42.9	6	3	3	1	0	1	-	-	-	-	-	-	18.0	1.0	0.4
19/4	1	3	25.0	3	0	3	-	-	-	-	-	-	-	-	-	6.0	0.7	0.5
20/4	9	13	40.9	61	43	18	1	1	0	-	-	-	1	0	1	48.0	2.9	1.3
21/4	15	23	65.2	25	6	19	2	0	2	-	-	-	1	1	0	97.0	0.7	0.6
22/4	18	16	52.9	56	24	32	1	0	1	-	-	-	-	-	-	89.0	1.7	0.7
23/4	9	15	37.5	17	2	15	-	-	-	-	-	-	-	-	-	52.0	0.7	0.3
24/4	5	0	100.0	28	13	15	-	-	-	-	-	-	-	-	-	15.0	5.6	1.9
25/4	6	9	40.0	17	2	15	-	-	-	-	-	-	-	-	-	21.0	1.1	0.8
26/4	33	10	76.7	140	95	45	4	3	1	-	-	-	6	1	5	123.5	3.5	1.2
27/4	51	8	86.4	243	140	103	4	3	1	1	0	1	-	-	-	205.5	4.2	1.2
28/4	77	28	73.3	351	204	147	10	10	0	1	0	1	1	0	1	420.5	3.5	0.9
29/4	58	55	51.3	134	43	91	6	5	1	3	0	3	-	-	-	305.5	1.3	0.5
30/4	10	2	83.3	18	1	17	2	1	1	-	-	-	1	0	1	34.5	1.7	0.6
1/5	11	10	52.4	28	12	16	6	4	2	-	-	-	-	-	-	42.0	1.6	0.8
2/5	9	6	60.0	16	2	14	-	-	-	-	-	-	-	-	-	35.0	1.1	0.5
3/5	1	12	7.7	2	1	1	-	-	-	-	-	-	-	-	-	18.0	0.2	0.1
4/5	8	7	53.3	12	1	11	10	2	8	-	-	-	1	0	1	29.0	1.5	0.8
5/5	17	13	56.7	27	5	22	6	1	5	-	-	-	-	-	-	79.5	1.1	0.4
6/5	11	6	64.7	37	25	12	5	5	0	-	-	-	-	-	-	39.5	2.5	1.1
7/5	3	3	50.0	2	0	2	3	0	3	-	-	-	-	-	-	38.0	0.8	0.1
8/5	1	1	50.0	0	0	0	1	1	0	-	-	-	-	-	-	8.0	0.5	0.1
Total	359	244	59.5	1229	626	603	62	36	26	5	0	5	11	2	9	1729.0		
Mean																	2.2	0.8
Percent Retained					49.1			41.9			100.0			81.8				
No. Caught per angler-hour					0.71			0.04			<0.01			0.01				
No. Caught per angler					2.04			0.1			0.01			0.02				

[1]Number caught
[2]Number released
[3]Number kept

Table 6. Information on the fishing period and creel census from Kakisa River, 1984.

Spring Fishing Period				Creel Census Period				Angler - Interviews	
From	To	Days	Percent Fished	From	To	Days	Percent Censused	Conducted	Possible
14 April	8 May	25	88	14 April	8 May	22	100	603	657

Table 7. Information on the catch, effort and catch per unit of effort for Arctic Grayling during the creel census period from Kakisa River, 1984.

No. Anglers	No. Caught	No. Released	No. Retained	Percent Retained	Hours Fished	Hours Fished Per Angler	No. Caught		No. Retained
							Per Angler-Day	Per Angler-Hour	Per Angler-Day
603	1229	626	603	49.1	1729	2.9	2.2	0.8	1.0

Table 8. Information on the total catch and harvest of Arctic grayling from Kakisa River, 1984.

No. Caught	No. Released	No. Retained	Estimated Release Mortality	Total Harvest Plus Mortality
1339	682	657	68	725

Table 9. Summary of number of anglers and angler-hours by place of residence as determined during the creel census period on Kakisa River, 1983.

Residence	Anglers Interviewed		Angler-Hours	
	Number	%	Number	%
Northwest Territories	417	67.5	1020.0	64.1
Alberta	190	30.7	539.5	33.9
British Columbia	8	1.3	20.0	1.3
Yukon	2	0.3	10.0	0.6
Manitoba	1	0.2	2.0	0.1
Total	618		1591.5	

Table 10. Summary of number of anglers and angler-hours by place of residence as determined during the creel census period on Kakisa River, 1984.

Residence	Anglers Interviewed		Angler-Hours	
	Number	%	Number	%
Northwest Territories	376	62.4	956.0	55.3
Alberta	224	37.1	764.0	44.2
British Columbia	1	0.2	1.0	0.1
U.S.A.	2	0.4	8.0	0.5
Total	603		1729.0	

Table 11. Creel census summary for Arctic grayling from Kakisa River, 1974-1984.

Year	Angler Interviews		% of anglers	Number of grayling reported			% retained	Hours of Fishing Reported	No. of grayling caught	
	Conducted	Possible	Interviewed	Caught	Released	Retained			Per Angler	Per Angler-Hour
1974	114	358	32	185	14	181	98	408	1.6	0.5
1975	150	525	29	178	19	159	89	458	1.2	0.4
1976	764	890	86	642	41	601	94	2054	0.8	0.3
1977	476	533	89	408	53	365	87	1079	0.9	0.4
1978	477	506	94	705	66	639	91	1736	1.5	0.4
1979	764	891	86	972	164	808	83	2990	1.3	0.3
1980	468	482	97	1297	621	679	52	1276	2.8	1.0
1983	618	618	100	1246	591	655	53	1592	2.0	0.8
1984	603	657	92	1229	626	603	49	1729	2.0	0.7

Table 12. Biological data by length interval for angled Arctic grayling from Kakisa River, 1983.

LENGTH INTERVAL (MM)	MALES N	MALES LENGTH(MM) MEAN	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
290	-	-	-	-	-	-	1	293	300	-	1.19	0	1	293	300	-	1.19	0
340	-	-	-	-	-	-	1	349	480	-	1.13	100	1	349	480	-	1.13	100
350	-	-	-	-	-	-	1	350	490	-	1.14	0	1	350	490	-	1.14	0
360	2	362	560	14	1.19	0	2	364	570	28	1.18	100	4	363	565	19	1.18	50
370	1	375	700	-	1.33	100	4	374	683	54	1.30	75	5	374	686	47	1.31	80
380	11	384	676	49	1.19	100	7	382	751	55	1.34	100	18	384	705	63	1.25	100
390	8	395	797	90	1.30	100	11	393	700	226	1.15	100	19	394	741	185	1.21	100
400	16	406	790	55	1.18	100	10	405	824	53	1.24	100	26	406	803	56	1.20	100
410	16	415	863	48	1.21	100	17	413	844	80	1.19	100	33	414	853	66	1.20	100
420	20	424	899	40	1.18	100	15	423	943	112	1.24	100	35	424	918	81	1.21	100
430	14	433	976	59	1.20	100	17	435	947	78	1.15	100	31	434	960	71	1.17	100
440	19	442	982	81	1.14	100	8	443	1049	91	1.21	100	27	442	1001	88	1.16	100
450	4	452	1073	75	1.16	100	3	452	1180	154	1.28	100	7	452	1119	118	1.21	100
460	5	464	1178	75	1.18	100	2	464	1100	85	1.10	100	7	464	1156	80	1.16	100
470	-	-	-	-	-	-	1	470	1040	-	1.00	100	1	470	1040	-	1.00	100
500	-	-	-	-	-	-	1	505	1080	-	0.84	100	1	505	1080	-	0.84	100
TOTAL	116						101						217					
MEAN		420	884	138	1.19			414	863	183	1.20			417	874	161	1.20	

Table 13. Biological data by age group for angled Arctic grayling from Kakisa River, 1983.

AGE (YR)	MALES N	MALES LENGTH(MM) MEAN	MALES LENGTH(MM) SD	MALES WEIGHT(G) MEAN	MALES WEIGHT(G) SD	MALES K	MALES % MAT	FEMALES N	FEMALES LENGTH(MM) MEAN	FEMALES LENGTH(MM) SD	FEMALES WEIGHT(G) MEAN	FEMALES WEIGHT(G) SD	FEMALES K	FEMALES % MAT	COMBINED N	COMBINED LENGTH(MM) MEAN	COMBINED LENGTH(MM) SD	COMBINED WEIGHT(G) MEAN	COMBINED WEIGHT(G) SD	COMBINED K	COMBINED % MAT
3	-	-	-	-	-	-	-	1	293	-	300	-	1.19	0	1	293	-	300	-	1.19	0
4	2	371	14.8	580	42	1.14	50	-	-	-	-	-	-	-	2	371	14.8	580	42	1.14	50
5	22	397	14.7	758	84	1.20	95	15	378	16.9	639	203	1.17	87	37	390	18.1	709	154	1.19	92
6	37	416	16.1	861	93	1.20	100	23	403	13.4	817	99	1.24	100	60	411	16.1	844	97	1.21	100
7	33	430	15.9	944	115	1.18	100	21	421	21.2	926	107	1.24	100	54	427	18.5	937	111	1.20	100
8	12	435	22.2	995	156	1.20	100	22	428	17.8	935	156	1.19	100	34	430	19.5	956	157	1.19	100
9	5	447	8.2	1016	110	1.13	100	13	437	10.9	982	129	1.18	100	18	440	11.1	991	122	1.16	100
10	1	444	-	1080	-	1.23	100	3	432	10.3	927	83	1.15	100	4	435	10.2	965	102	1.17	100
11	2	455	14.8	960	127	1.02	100	1	505	-	1080	-	0.84	100	3	471	31.0	1000	114	0.96	100
TOTAL	114							99							213						
MEAN		420	23	885	139	1.19			414	29.0	862	184	1.20			417	25.9	874	161	1.20	
MEAN AGE	6.8																				

Table 14. Biological data by length interval for angled Arctic grayling from Kakisa River, 1984.

LENGTH INTERVAL (MM)	MALES						FEMALES						COMBINED					
	LENGTH(MM)		WEIGHT(G)			%	LENGTH(MM)		WEIGHT(G)			%	LENGTH(MM)		WEIGHT(G)			%
	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT	N	MEAN	MEAN	SD	K	MAT
350	1	356	510	-	1.13	100	1	350	930	-	2.17	100	2	353	720	297	1.65	100
360	1	360	560	-	1.20	0	5	363	610	47	1.27	100	6	363	602	47	1.26	83
370	5	374	648	69	1.24	100	2	373	625	7	1.21	50	7	373	641	58	1.23	86
380	2	386	730	42	1.27	100	2	385	685	21	1.20	100	4	385	708	38	1.24	100
390	1	390	870	-	1.47	100	19	394	763	69	1.24	100	20	394	769	71	1.26	100
400	11	404	821	82	1.24	100	14	403	819	57	1.25	93	25	404	820	68	1.25	96
410	19	415	885	55	1.24	100	17	412	832	84	1.19	100	37	414	860	73	1.21	97
420	12	424	924	70	1.21	100	12	424	904	46	1.19	100	25	424	911	60	1.20	96
430	16	434	1008	55	1.23	100	8	433	1033	75	1.27	100	24	434	1016	62	1.25	100
440	11	445	1076	92	1.22	100	5	442	1012	85	1.17	100	16	444	1056	93	1.21	100
450	8	454	1097	154	1.17	100	4	453	1170	130	1.26	100	13	454	1150	174	1.23	92
460	3	461	1143	35	1.16	100	2	463	1225	318	1.23	100	5	462	1176	167	1.19	100
TOTAL	90						91						184					
MEAN		422	931	156	1.23			410	857	157	1.24			416	896	165	1.23	

Table 15. Biological data by age group for angled Arctic grayling from Kakisa River, 1984.

AGE (YR)	MALES							FEMALES							COMBINED						
	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%	LENGTH(MM)			WEIGHT(G)			%
	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT	N	MEAN	SD	MEAN	SD	K	MAT
4	5	372	10.2	644	93	1.25	100	2	364	4.9	610	71	1.27	100	7	369	9.5	634	83	1.25	100
5	2	407	6.4	755	92	1.12	100	7	388	21.9	750	145	1.28	86	9	392	20.8	751	130	1.24	89
6	47	414	17.1	886	121	1.24	98	46	406	17.0	834	96	1.25	98	93	410	17.5	860	112	1.24	98
7	26	437	14.0	1018	117	1.22	100	25	419	20.9	909	199	1.22	100	53	428	19.6	960	169	1.22	100
8	7	449	11.6	1093	81	1.21	100	9	439	19.1	993	154	1.17	100	16	443	16.6	1037	134	1.19	100
9	1	458	-	1180	-	1.23	100	-	-	-	-	-	-	-	1	458	-	1180	-	1.23	100
TOTAL	88							89							179						
MEAN		422	23	928	156	1.23			411	23.2	860	156	1.24			416	23.8	893	158	1.23	
MEAN AGE	6.4																				